Faculty of Engineering
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Clarification of effective stress for unsaturated soils and its application to static liquefaction of infinite slope during rainfall

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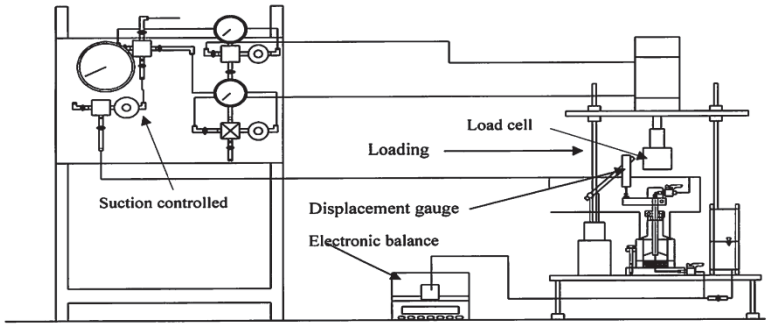

Fig. 1 Suction controlled consolidometer apparatus

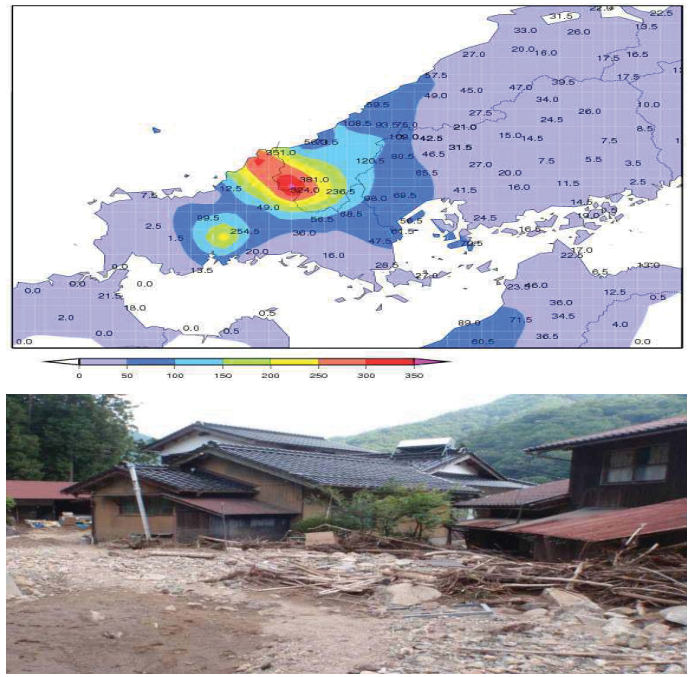

Fig. 2 The precipitation in Tuwano-Cho on 28th July in 2013 and its avalanche of rock and earth

Content:

Soil mechanics had established by finding out effective stress principle for saturated soils. The absolute assumption of it is that soil particles and water are incompressible. However, unsaturated soils includes high compressible air. Bishop has proposed the famous effective stress, but his equation was denied by the collapse phenomena with the decrease of suction. Moreover it is too difficult to determine the effective stress parameter χ.

Recently, elasto-plastic and seismic response analyses of unsaturated ground are performed by using the simple effective stress which χ is equal to degree of saturation S_r. The validity of this equation was verified the suction controlled consolidometer apparatus as shown in Fig.1. I will intend to apply effective stress for unsaturated to static liquefaction of infinite slope during guerilla heavy rainfall as shown in Fig.2. As avalanche of rock and earth is occurred when soils changes from solid to liquid, that is, static liquefaction, then there are no effective stresses in unsaturated soils slope. I will mathematically solve instability of infinite slope.

Keywords: soil water characteristic curve, suction, static liquefaction

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